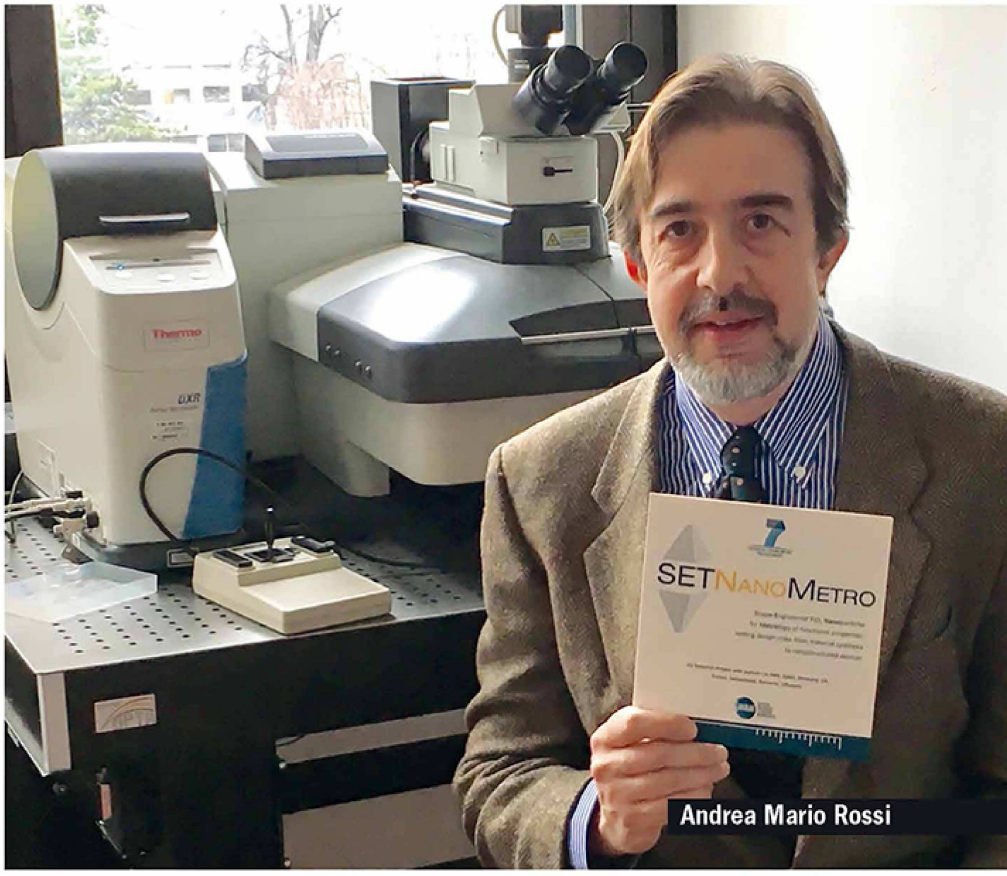
Nanometrology for a better world

SETNanoMetro

TiO_2 engineered nanoparticles for metrology of functional properties

The use of nanomaterials is at the basis of technological and industrial revolution of the third millennium and titanium dioxide nanoparticles play a leading role, thanks to their wide use in many industries, from biomedical to cosmetics, from paints to solar cells . The challenge today is to be able to know and control the infinitely small to exploit the full potential and the project SETNanoMetro took up the challenge and addressed using the science of measurements. Metrology as a weapon to undermine the inaccessibility of nanoscale world and make it available to the industry for optimizing the performance of its products: this is the aim of the European consortium of 16 partners whose for 40 months have been working in collaboration and synergy, from the production of engineered nanoparticles to their characterization. Funded with 5.6 million Euros from the European Commission under the 7th Framework Programme, beginning 1st in December 2013 and ending March 31st, 2017, SETNanoMetro is coordinated by the National Institute of Metrological Research and involved university, industry and centres of research from nine European countries. The partners have worked closely with the aim to produce reference materials and standard characterization procedures, in order to improve knowledge on titanium dioxide and characterize the functional properties based on parameters such as shape and size. Nanoparticles of titania into crystalline phases such as anatase, rutile and brukite were produced by hydrothermal synthesis and characterized by geometric and dimensional point of view with very low uncertainty and are now available on the market. The production is today realized on a large scale, as regards both the powders both the films, in which engineered nanoparticles deposited into two-dimensional layers for applications in the biomedical field or construction. Exploiting the specific properties of titanium dioxide, a tool to test the photocatalytic properties of titanium dioxide-based paints directly in situ has been fabricated. This reactor allows to give traceable measurement in order to compare and certify the degradation properties of the main polluting gases known indoor and outdoor and it is currently available on the market. The product titanium dioxide was also used to evaluate the performance of photoelectrochemical Grätzel cells. Given the widespread use of the world in nanometric form of this material were also evaluated in toxicity according both to the crystalline phase that the shape and size. The project has thus provided a metrological approach to the industries to know, to modulate and therefore optimize nanomaterials and performance of the products that contain them.



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